GBBP & SAP
SEMESTER I dan II

KURIKULUM
JURUSAN TEKNIK MESIN
FAKULTAS TEKNIK – UNDIP
Tahun 2007

SYLLABUS

Subject Title : **Physics I**
Subject Code / Academic Unit / Semester : **TKM 113 / 3 / I**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1	Units Standard Measurement Standard Vector Review	Ref. 1 Ch. 1 , 2 Ref. 2 Ch. 1		Students understand about standard of units, system and measurement and also vector operations		
2	1-D Motion	Ref. 1 Ch. 3 Ref. 2 Ch. 3 Ref. 3 Ch. 1		Students understand about 1 dimension motion		
	Quiz 1	1st and 2nd session		Students are able to solve quiz problems.		
3	Motion on a plane (2-D)	Ref. 1 Ch. 4 Ref. 3 Ch. 2		Explain about motion on 2-dimension or on a plane		
4	Newton's Law (Particles Dynamics)	Ref. 1 Ch. 5 Ref. 3 Ch. 3		Explain the Newton's Law about particles dynamics		
5	Dynamics Laws Applications	Ref. 2 Ch. 5		Explain the application of Newton's Law for the particles dynamics problems.		
6	3-Dimension Kinematics	Ref. 2 Ch. 7		Explain velocity and acceleration problems on 3-dimension frame		
7	MIDTERM EXAMINATION	1st to 6th session		Students are able to solve midterm examination problems.		
8	Motion on a plane (Particles Dynamics 2)	Ref. 1 Ch. 6 Ref. 2 Ch. 9 Ref. 3 Ch. 5		Explain about: friction forces, curvilinear motion, Force classification based on classic mechanics and quantum mechanics		
9	Rotational Kinematics	Ref. 1 Ch. 11 Ref. 2 Ch. 10		Explain about: Rotational motion, angular and tangential velocity and acceleration.		
9	Rotational Dynamics	Ref. 1 Ch. 12 Ref. 2 Ch. 11 Ref. 3 Ch. 8		Explain about: particles angular momentum, particles system, rotational dynamics of a rigid body		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
10	Oscillatory and Harmonic Motion	Ref. 1 Ch. 15 Ref. 2 Ch. 16 Ref. 3 Ch. 10		Explain about oscillatory and harmonic motion		
11	Impulse and Momentum	Ref. 1 Ch. 5 Ref. 2 Ch. 8		Explain about: momentum, momentum conservation law, 2D and 3D impact		
	Quiz 2	8^{th},9^{th}, and 10^{th} session		Students are able to solve quiz problems.		
12	Work and Power	Ref. 1 Ch. 7 Ref. 3 Ch. 14, 15 Ref. 3 Ch. 6		Explain about the principles of work, power, and energy		
13	Fluid Static and Dynamics	Ref. 1 Ch. 17, 18 Ref. 2 Ch. 18		Explain about the principles of fluid static and dynamics		
14	Temperature and Heat	Ref. 1 Ch. 21, 22 Ref. 2 Ch. 19 Ref. 3 Ch. 11,12,13		Explain about the concept of temperature, heat, and thermodynamics law		
15	FINAL EXAMINATION					

STANDARD COURSE DESCRIPTION

PHYSICS I

Subject Title	:	Physics I
Subject Code/Academic Unit	:	TKM 113 / 3
Semester	:	I
Prerequisite	:	---
Brief Information	:	1. This subject is included in basic science 2. Minimum Students Presence: 75% 3. Course includes class lecture sessions, homework, quizzes, a group report of literature search on assigned topics, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	0
Home work		1 week		Opened book	10
Quiz		30 minutes after one chapter of course finished		Opened book / closed book	20
Midterm Exam.		120 Minutes		--	30
Final Exam.		120 Minutes		--	40

References:

1. Halliday & Resnick., *Fisika Jilid 1*, Penerbit Erlangga., Jakarta, 1996.
2. Zafiratos, Chris D., *Physics*, John Wiley & Sons Inc., New York, 1976.
3. Kane & Sternheim, *Physics*, John Wiley & Sons Inc., New York, 1980.

Suggestion:

1. Other physics books.

General Learning Outcomes/Objectives:

Students will understand about basic principles of physics laws of:

1. 1 D, 2 D, and 3 D motions
2. Particles dynamics
3. Work and energy
4. Impulse and momentum
5. Temperature and Heat
6. Fluid static and dynamics

SYLLABUS

Subject Title : **English I**
Subject Code / Academic Unit / Semester : **TKM 113 / 2 / I**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1.	Structure : Review Tenses	Ref. 1,2,3		▪ Understanding and using tenses to sentences		
2.	Structure : Problems with verbs, adverbs, nouns and pronouns	Ref. 1,2,3		▪ Understanding and using them to sentences		
3.	Active Reading : Text 1 and Text 2	Ref. 1,2,3		▪ Answer questions in the active reading exercise ▪ Enrich the vocabulary		
4.	Writing : Paragraph and Essay Development	Ref. 1,2,3		▪ Know how to write unified and coherent paragraphs and essays		
5.	Structure : Problems with adjectives, comparatives, prepositions and conjunctions	Ref. 1,2,3		Understanding and using them to sentences		
6.	Active Reading : Text 3 and Text 4	Ref. 1,2,3		Answer questions in the active reading exercise Enrich the vocabulary		
7.	Writing : Narration	Ref. 1,2,3		Student can establish the situation, develop characters, present actions and ideas, and express themes		
8.	MIDTERM EXAMINATION	Ref. 1,2,3		Midterm. results		
9.	Structure : Problems with agreement, introductory verbal modifiers and parallel structure	Ref. 1,2,3		▪ Problems with Prepositions and Conjunctions		
10.	Active Reading : Text 5 and Text 6	Ref. 1,2,3		▪ Answer questions in the active reading exercise ▪ Enrich the vocabulary		
11.	Writing : Description	Ref. 1,2,3		▪ Students can create impressions that are vivid, real and lifelike for the reader		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
12.	Active Reading : Text 7 and Text 8	Ref. 1,2,3		▪ Answer questions in the active reading exercise ▪ Enrich the vocabulary		
13.	Writing : Illustration	Ref. 1,2,3		Students can give examples that provide details and facts		
14.	Active Reading : Text 9 and Text 10	Ref. 1,2,3		Answer questions in the active reading exercise Enrich the vocabulary		
15.	Writing : Process Analysis	Ref. 1,2,3		Students can explain how something is done, how something works and how something occurs.		
16.	FINAL EXAMINATION	Ref. 1,2,3		Final Exam. Results		

ENGLISH I

Subject Title	:	English I
Subject Code/Academic Unit	:	TKM 113 / 2
Semester	:	I
Prerequisite	:	---
Brief Information	:	1. This subject is included in basic social science 2. The devices which are needed to accommodate this course are white board, OHP, In-focus, computer, and audio (conditional) 3. Minimum Students Presence: 75% 4. Students must read the handbook that is suggested by lecturer 5. Course includes class lecture sessions, individual and group task, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	
Individual Task					
Group Task					
Midterm Exam.				--	
Final Exam.				--	

References:

1. Panman, Sandra., Panman, Richard., *The Active Reader for Writers*, Active Learning Corporation, USA, 1991
2. Azar, Betty Schrampfer., *Understanding and Using English Grammar*, 2nd edition Prentice Hall Regents, USA, 1989
3. Sharpe, Pamela J., Barron's How to Prepare for the Toefl, Binarupa Aksara, Indonesia, 1992.

General Learning Outcomes/Objectives:

1. This class will provide students with a review of the problems in structure and written expression
2. This class will provide students with an ability to write in English language.
3. This class will enrich the vocabulary of students and will improve reading comprehension.

SYLLABUS

Subject Title : **Engineering Chemistry**
Subject Code / Academic Unit / Semester : **TKM 115 / 2 / I**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1.	Introduction Chemical process in engineering field	Ref. 1 Ch. 1 Ref. 2 Ch. 1		Introduce chemical processes in engineering field Define the basic of chemical reaction, Volta's series		
2.	Atomic bonding in solid, liquid, and gas, Forces on Chemical bonding	Ref.1 Ch. 2		Define: Chemical bonding and bonding forces on atom		
3.	Fuels: Solid, Liquid, Gas, Nuclear	Ref. 1 Ch. 3		Define: 1. Solid, liquid, gas, and nuclear fuels 2. the advantages and weakness of four fuels types that are mentioned above in combustion		
4.	Chemical elements that are contained in fuels, Combustion effects, and material corrosion	Ref. 1 Ch.4		Define: Chemical elements that are contained in fuels, combustion effects, and corrosion effects.		
5.	Heat Value, Flash Point, Ignition Point	Ref. 1 Ch 5 Ref. 2 Ch. 7		Define: Flash point, ignition point, heat value and fuels handling		
6.	Octane Number, Ideal and actual combustion reaction	Ref. 1 Ch 6 Ref. 2 Ch. 8		Define: 1. Meaning of octane number in combustion 2. Ideal and actual combustion, AFR		
7.	MIDTERM EXAMINATION	-		MIDTERM EXAM. RESULTS		
8.	Orsat Devices, Smoke-Gas Analysis, Green house effect, air pollution	Ref. 1 Ch. 7 Ref. 3 Ch.4		Define: • orsat analysis • Analysis of combustion gas and air pollution effects		
9.	Water Hardness, Water requirements for industries	Ref. 1 Ch. 8 Ref. 2 Ch. 10		Define: Water hardness and water quality in industries		
10.	Liquid Phase Sintering, Enhanced Sintering Technique, Hot Consolidation Technique	Ref. 1 Ch. 8 Ref. 2 Ch. 11		Define: 1. Basic Consolidation Technique, liquid phase sintering 2. Hot consolidation technique		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
11.	Water impurities to the quality of boiler and cooling tower feed water,	Ref. 1 Ch. 8,9 Ref. 2 Ch 13-14		Define: Water quality effect, that is used in boiler and cooling tower, to the scale and material corrosion forming		
12.	High Temperature corrosion effect caused by combustion process	Ref. 2 Ch. 23 Ref. 3 Ch. 5		Define: Combustion process and its side effects to material corrosion and its anticipation		
13.	Material balance reaction, compound forming, affinity effect of an atom to compound bonding	Ref. 2 Ch. 15,16 Ref. 3 Ch. 5		Define: Electron Affinity Concept of an atom to compound		
14.	Group Task	-		Presentation		
15.	Group Task	-		Presentation		
16.	FINAL EXAMINATION	-		Final Exam. Results		

STANDARD COURSE DESCRIPTION

ENGINEERING CHEMISTRY

Subject Title	:	Engineering Chemistry I
Subject Code/Academic Unit	:	TKM 115 / 2
Semester	:	I
Prerequisite	:	---
Brief Information	:	1. This subject is included in material engineering departmental program course 2. The devices which are needed to accommodate this course are white board, OHP, In-focus, and computer (conditional) 3. Minimum Students Presence: 75% 4. Students must read the handbook that is suggested by lecturer 5. Course includes class lecture sessions, individual and group task, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	5
Individual Task		1 week		Opened Book	10
Group Task		3 weeks		Opened Book	10
Midterm Exam.		120 minutes		Opened/Closed Book	35
Final Exam.		120 minutes		Opened/Closed Book	40

References:

1. Korsurnsky, The Atomic Nucleus
2. Brown, G.T, Introduction to Physical Chemistry, 1990
3. Klar , Handbook of Air Conditioning system Design, Carrier Air Conditioning Company, McGraw-Hill Book Company
4. Journals.

General Learning Outcomes/Objectives:

1. Students will understand and able to explain combustion concept, AFR, and pollution effects to the environment.
2. Students will able to analyze the quality of boiler and cooling tower feed water.

3. Students will understand and able to analyze the elements properties to the compound forming and corrosion effect

COURSE OUTLINE

Subject : MACHINE DRAWING
Subject Code : TKM
Short description : This course given on 1st semester, the purpose is so student can understand standard rules of machine drawing Which can be use for working picture
General Objective : Student Have the ability to identify, made, read machine drawing standard

No	SPESIFIC OBJECTIVE	MAIN COURSE DESCRIPTION	SUB COURSE DESCRIPTION	TIME ESTIMATION (MENIT)	LEARNING METHOD	DESIRABLE STUDENT COMPETENCIES	TEXT BOOK SOURCE
1	Student can understand engineering drawing and engineering standard drawing Student able to identify various type of tools which are used to make engineering	Introduction, Drawing tools	• Drawing development • Drawing purposes • Drawing standard • Type and paper size • Ruler, jangka, mal • Pencil & ink tools • Drawing Table	100	Presentation, problem exercise, drawing task	Student able to understand drawing as a tools to communicate	Ref. 1 & Ref. 2
2	Student able to identify and using various type of line and letter Student able to identify and using dimensional writing Student able to identify and using scale	Lines and letter Dimension and scale	Kinds of lines, letter and its application How to write a dimension Scale and calculations	100	Presentation, problem exercise, drawing task	Student able to understand how important neat is	Ref. 1 & Ref. 2
3	Student able to identify and making basic shape using available drawing tools Student able to identify and making object using projection technique	Basic shape Projection	Line and angle Circle, ellipses, parabolic hyperbolic and polygon Touch line Envolute, epicycloid and hypocycloid Projection type	100	Presentation, problem exercise, drawing task	Student able to explain object in a better way	Ref. 1 & Ref. 2

			US and Europe Projection				
4	Student able to make lines formed by object intersection	Intersection lines	Intersection line made by: a. Intersection between hollow object b. Intersection between solid object c. Intersection between solid and hollow object	100	Presentation, problem exercise, drawing task	Student able to explain interaction between objects	Ref. 3
5	Student able to identify sketch drawing technique and making sketch of an object	Sketch technique	Object sketching	100	Presentation, problem exercise, drawing task	Student able to explain and making drawing object	Ref. 3
6	Student able to identify and using CAD software	CAD software	2 dimension CAD drawing technique	100	Presentation, problem exercise, drawing task	Student able to interact with computer	Ref. 3
7	MID EXAM			100			
8	Student can understand how important drawing machine as a representative picture of engineering picture	Machine drawing usage Drawing standardization Concurrent design introduction	Machine drawing usage Drawing standardization Concurrent design introduction	100	Presentation, problem exercise, drawing task	Student able to understand drawing as a tools to communicate	Ref. 1 & Ref. 3
9	Student have the ability to show units, units tolerance and geometri, working sign and surface roughness also to identify several measuring tools and its use	Units and measuring tools Units Tolerance Unit geometry Working sign and surface roughness	Units showing procedure Measuring types Exact measurement Surface roughness	100	Presentation, problem exercise, drawing task	Student able to understand how important the neat is in a drawing	Ref. 1 & Ref. 3
10	Student have the ability to make machine element drawing procedure and ways to make it simple	Machine element drawing	Thread element Spring element Transmission element system (shaft, pad, gears, chain, sprocket, pulley, belt,	100	Presentation, problem exercise, drawing task	Student have the motivation to learn about machine element	Ref. 1 & Ref. 3

			etc.) Drawing formation				
11	Student have the ability to make explain welded connection on machine drawing	Welded connection picture	Introduction of welding technology Welding shape Welding symbol	100	Presentation, problem exercise, drawing task	Student able to give information through picture	Ref. 1 & Ref. 3
12	Student able to identify plate working tools and technique Student able to make unfold picture from 3D surface into 2D	Plate working picture Object intersection picture Unfold	Plate working introduction Object intersection review Unfold	100	Presentation, problem exercise, drawing task	Student able to give information through picture	Ref. 3
13	Student able to identify various component into part of a piping system Student have the ability to mastering piping system procedure	Picture of piping system Piping system tools	Introduction of piping system Piping system component Piping system component symbol	100	Presentation, problem exercise, drawing task	Student able to give information through picture	Ref. 3
14	Student able to mastering the procedure of making machine element from the real object	Redrawing technique of machine element	Sketch technique Machine element sketch Measuring tools usage	100	Presentation, problem exercise, drawing task	Student able to give information through picture	Ref. 3
15	Student able to make presentation of a machine drawing	Drawing presentation technique	Presentation plan Making presentation technique Communication technique	100	Presentation, problem exercise, drawing task	Student able to give information through picture	Ref. 3
16	FINAL EXAM						

Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983

2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 3 x 10 minutes
Lecture : 1st

A. Course Objective
1. General Objective : Have the ability to identify, made, read machine drawing with standard
2. Specific Objective : Student can understand engineering drawing and engineering standard drawing

B. Desirable student competencies:
Student able to understand drawing as a tools to communicate

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Introduction, Drawing tools

E. Sub Course description:
- Drawing development
- Drawing purposes
- Drawing standard
- Type and paper size
- Ruler, jangka, mal
- Pencil & ink tools
- Draring Table

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. explaining course material	Paying attention	LCD

			2. assessment method	Asking and suggesting	White board Color marker
2	PRESENTATION	70	Preface Drawing tools	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 2nd

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to identify and using various type of line and letter
Student able to identify and using dimensional writing
Student able to identify and using scale

B. Desirable student competencies:
Student able to understand how important neat is

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Lines and letter
Dimension and scale

E. Sub Course description:
Kinds of lines, letter and its application
How to write a dimension
Scale and calculations

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation	Paying attention	LCD

			2. assessment method	Asking and suggesting	White board Color marker
2	PRESENTATION	70	Lines and letter Dimension and scale	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 3rd

A. Course Objective
   1. General Objective :
      Have the ability to identify, made, read machine drawing with standard method
   2. Specific Objective :
      Student able to identify and making basic shape using available drawing tools
      Student able to identify and making object using projection technique

B. Desirable student competencies:
   Student able to explain object in a better way

C. Course Method:
   Presentation, problem exercise, drawing task.

D. Main course description:
   Basic shape
   Projection

E. Sub Course description:
      Line and angle
      Circle, ellipses, parabolic hyperbolic and polygon
      Touch line
      Envolute, epicycloid and hypocycloid
      Projection type
      US and Europe Projection

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker
2	PRESENTATION	70	Basic shapes Projection	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 4th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to make lines formed by object intersection
B. Desirable student competencies:
Student able to explain interaction between objects
C. Course Method:
Presentation, problem exercise, drawing task.
D. Main course description:
Intersection lines
E. Sub Course description:
Intersection line made by:
a. Intersection between hollow object
b. Intersection between solid object
c. Intersection between solid and hollow object
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board

					Color marker
2	PRESENTATION	70	Intersection line made by: a. Intersection between hollow object b. Intersection between solid object c. Intersection between solid and hollow object	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 5th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to identify sketch drawing technique and making sketch of an object

B. Desirable student competencies:
Student able to explain and making drawing object

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Sketch technique

E. Sub Course description:
Object sketching

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker
2	PRESENTATION	70	Sketch technique	Paying attention Write important material Problem exercise	LCD White board Color marker

				Asking and suggesting	
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 6th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to identify and using CAD software
B. Desirable student competencies:
Student able to interact with computer
C. Course Method:
Presentation, problem exercise, drawing task.
D. Main course description:
CAD software
E. Sub Course description:
2 dimension CAD drawing technique
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker
2	PRESENTATION	70	CAD software 2 dimension CAD	Paying attention Write important material Problem exercise	LCD White board Color marker

			drawing technique	Asking and suggesting	
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giveing homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 7th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student can understand how important drawing machine as a representative picture of engineering picture

B. Desirable student competencies:
Student able to understand drawing as a tools to communicate

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Machine drawing as a part of engineering

E. Sub Course description:
Machine drawing usage
Drawing standardization
Concurent design introduction

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker

2	PRESENTATION	70	Machine drawing usage Drawing standardization Concurent design introduction	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 8th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student have the ability to show units, units tolerance and geometri, working sign and surface roughness also to identify several measuring tools and its use

B. Desirable student competencies:
Student able to understand how important the neat is in a drawing

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Units and measuring tools
Units Tolerance
Unit geometry
Working sign and surface roughness

E. Sub Course description:
Units showing procedure
Measuring types
Exact measurement
Surface roughness

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker
2	PRESENTATION	70	Units showing procedure Measuring types Exact measurement Surface roughness	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 9th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student have the ability to make machine element drawing procedure and ways to make it simple

B. Desirable student competencies:
Student have the motivation to learn about machine element

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Machine element drawing

E. Sub Course description:
Thread element
Spring element
Transmission element system (shaft, pad, gears, chain, sprocket, pulley, belt, etc.)
Drawing formation

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board

					Color marker
2	PRESENTATION	70	Thread element Spring element Transmission element system (shaft, pad, gears, chain, sprocket, pulley, belt, etc.) Drawing formation	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 10th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student have the ability to make explain welded connection on machine drawing

B. Desirable student competencies:
Student able to give information through picture

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Welded connection picture

E. Sub Course description:
Introduction of welding technology
Welding shape
Welding symbol

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker

2	PRESENTATION	70	Introduction of welding technology Welding shape Welding symbol	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 11th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to identify plate working tools and technique
Student able to make unfold picture from 3D surface into 2D

B. Desirable student competencies:
Student able to give information through picture

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Plate working picture
Object intersection picture
Unfold

E. Sub Course description:
Introduction of welding technology
Welding shape
Welding symbol

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE

1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker
2	PRESENTATION	70	Plate working picture Object intersection picture Unfold	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 12th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to identify various component into part of a piping system
Student have the ability to mastering piping system procedure

B. Desirable student competencies:
Student able to give information through picture

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Picture of piping system
Piping system tools

E. Sub Course description:
Introduction of piping system
Piping system component
Piping system component symbol

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation	Paying attention	LCD

			2. assessment method	Asking and suggesting	White board Color marker
2	PRESENTATION	70	Introduction of piping system Piping system component Piping system component symbol	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 13th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to mastering the procedure of making machine element from the real object

B. Desirable student competencies:
Student able to give information through picture

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Redrawing technique of machine element

E. Sub Course description:
Sketch technique
Machine element sketch
Measuring tools usage

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker

2	PRESENTATION	70	Sketch technique Machine element sketch Measuring tools usage	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

STANDART COURSE OUTLINE

Subject : **MACHINE DRAWING**
Subject Code : TKM
Subject Credit : 2
Class schedule : 2 x 50 minutes
Lecture : 14th

A. Course Objective
1. General Objective :
Have the ability to identify, made, read machine drawing with standard method
2. Specific Objective :
Student able to make presentation of a machine drawing

B. Desirable student competencies:
Student able to give information through picture

C. Course Method:
Presentation, problem exercise, drawing task.

D. Main course description:
Drawing presentation technique

E. Sub Course description:
Presentation plan
Making presentation technique
Communication tehnique

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	15	1. last week task explanation 2. assessment method	Paying attention Asking and suggesting	LCD White board Color marker

2	PRESENTATION	70	Presentation plan Making presentation technique Communication tehnique	Paying attention Write important material Problem exercise Asking and suggesting	LCD White board Color marker
3	CLOSING	15	1. giving course conclusion 2. giving homework 3. next week course illustration	Paying attention Answering question Giving homework	LCD White board Color marker

G. Method of assessment

Random question to student during classes

H.Text Book

1. Sato, Takeshi ; Sugiarto, N ; Menggambar Mesin Menurut ISO, Pradya Paramitra, 1983
2. Svensen, Street, Engineering Graphics, Von Nostrand, 1988
3. Simmons, Collin H; Maguire, Dennis E; Manual of Engineering Drawing, Elsevier, 2004

SYLLABUS

Subject Title : **Principles of Engineering and Basic Science**
Subject Code / Academic Unit / Semester : **TKM 117 / 2 / I**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1	THE PROFESSION: The Profession of Engineering, Engineer; Field of Engineering; Prepare to Become an Eng.; Eng. As A profession; Challenges for The Future	Ref. 1 Ch. 1		Classify field of the profession of engineering; define the stage to be an engineer; apply ethic code of profession; identify future challenges		
2	THE APPROACH: The Methodology of Eng. Problem Solving; The Search for Solution; The Eng. Design Process	Ref. 1 Ch. 2; web site patent; Magazines		Define the methodology of Eng. problem solving; able to search information; can definite stages of the Eng. Design Process		
	THE TOOLS					
3	The Tools of Mathematics and Science : Mathematical Analysis; Scientific Concepts;			Know about functions and roles of mathematics and science concept as the engineering tools in problem solving		
4	DIGITAL COMPUTERS : Digital computer hardware; Computer Software			Know about functions and roles of the components that work in digital computer systems		
5	EXPERIMENTS and TEST: Experiments; Experimental Data	Ref. 1 Ch. 5		Know about functions and roles of experiments and testing as the engineering tools in problem solving		
6	EXPERIMENTS and TEST : Statistical Analysis of Experimental Data; Testing	Ref. 1 Ch. 5		Know about functions and roles of statistics as the tools to identify the results in experiments/measurements		
7	Midterm Exam I					
8	COMMUNICATION : General aspects of effective Communication; Written Communication; Oral Communication; Graphical Communication; Computers and Communication	Ref. 1 Ch. 6		Able to communicate effectively, both in oral or written, and know the means that support it.		
9	Computer-Aided Engineering(CAD/CAM): Computer Aided Design; Computer Aided Manufacturing and Robotics; Computer Graphics; Finite Element Methods; Future Developments	Ref. 1 Ch. 7		Know about functions and roles of computer as the engineering tools in problem solving		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
10	Midterm Exam. II					
	Industrial Visitation					
	THE CONSTRAINTS					
11	ENGINEERING ECONOMICS : Rate of Return; The Time Value Of Money; Interest; Present Worth	Ref. 1 Ch. 8		Know about economic aspects which have roles in engineering decision making		
12	ENGINEERING ECONOMICS : Instalment Financing and Sinking Funds; Depreciation; Categories of Cost; Inflation	Ref. 1 Ch. 8		Know about economic aspects which have roles in engineering decision making		
13	INTERACTION WITH PEOPLE : Engineers and Management; Engineers and Law	Ref. 1 Ch. 9		Know about the interaction with people aspects (with non-engineering profession) that have roles in success making in practical careers		
14	INTERACTION WITH SOCIETY : Engineering and Government; Engineering and the Public	Ref. 1 Ch. 9		Know about the interaction with society aspects and roles of engineer in society		
15	Midterm Exam. III					

STANDARD COURSE DESCRIPTION

PRINCIPLES OF ENGINEERING & BASIC SCIENCE

Subject Title	:	Principles of Engineering and Basic Science
Subject Code/Academic Unit	:	TKM 117 / 3
Semester	:	I
Prerequisite	:	Physics, Chemistry, and Mathematics of Senior High School Level (SMU)
Brief Information	:	1. This subject becomes a requisite course which was named as Technology Concept before. Since this course contains the vision and mission of engineering profession, so it must be taught by several lecturer with different engineering backgrounds (team teaching) 2. The devices which are needed to accommodate this course are white board, OHP, In-Focus, and computer (Conditional) 3. Minimum Students Presence: 75% 4. Students must read the handbook that is suggested by lecturer 5. Course includes class lecture sessions, homework, paper writing and presentation, industrial visitation, and examination.

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	0
Homework		1 week		Min. 80 %	5
Midterm Exam. I	At 6th week	90 minutes		Opened/Closed Book	15
Midterm Exam. II	At 10th week	90 minutes		Opened/Closed Book	15
Midterm Exam. III	At 15th week	90 minutes		Opened/Closed Book	15
Industrial Visitation	At 12th/14th week	1 semester for preparation, 3 hours for visitation		Min. 2 industries	20
Paper & Presentation	Out from regular schedule of course	1 month for preparation, 30 minutes/group			30

References:

1. Duderstadt, J., J, Knoll, F., G., and Springer S., G., Principles of Engineering, John Willey & Sons, Ink, 1982.
2. Other references that is related with course topics

General Learning Outcomes/Objectives:

This course will give students in the first year about knowledge that can make self motivation, give an orientation, and appreciation to engineering profession, and engineering courses that will be facing in the next semester.

Target of Study

1. Students are able to perform engineering approaches to solve problems that use conventional knowledge concepts, but it is implicated to complicated problems, open-ended, and incomplete defined such engineering profession characteristics.
2. Give a satisfied experience to students in solving actual problems in the first stage, so it can build their self confidences
3. Students know, understand, and able to appreciate the main engineering tools, that cover basic science concepts, mathematics, computation, statistic methods, and experiment.
4. students are able to communicate their ideas or work reports, both in oral or written, in formal forum

SYLLABUS

Subject Title : **Engineering Drawing**
Subject Code / Academic Unit / Semester : **TKM 118 / 2 / I**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1	Introduction Drawing Development Drawing Function Drawing Standardization		Class lecture session	Students capable to understand how important the roles of engineering drawing and drawing standardization in engineering field		
2	Drawing Tools Paper sorts and sizes Ruler, divider, and french curves Pencil & ink devices Drawing table		Class lecture session	Students are able to know about engineering drawing devices		
3	Lines and Fonts Types of lines and fonts and its using		Class lecture session	Students are able to know and use many types of lines and fonts correctly.		
4	Dimensions and Scale Dimensions Writing, Scale and its calculation		Class lecture session	Students are able to know and use dimensions Students are able to know and use scale		
5	Basic Shapes Line and Angle, Circle, Ellipse, Parabola, Hyperbola & Polygon, Tangent Envolute, Epicycloidal and Hypocycloidal		Class lecture session	Students are able to know and make many types of basic shapes using drawing devices		
6	Projection Projection typess American & Europe Projections		Class lecture session	Students are able to know and make drawings from some objects with projection techniques		
7	Intersection Lines Intersection lines that is created by: a. Intersection between hollow objects b. Intersection between solid objects c. Intersection between hollow and solid objects		Class lecture session	Students are able to create lines that are created by objects intersection.		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
8	Sketch Techniques Shape Sketch of objects		Class lecture session	Students know sketch techniques and able to create a sketch of an object		
9	CAD Software 2 Dimension AutoCAD		Lab. Session	Students are able to know and use AutoCAD 2006 Software		

STANDARD COURSE DESCRIPTION

ENGINEERING DRAWING

Subject Title	:	Engineering Drawing
Subject Code/Academic Unit	:	TKM 118 / 2
Semester	:	I
Prerequisite	:	---
Brief Information	:	1. This subject becomes a prerequisite course for mechanical drawing course 2. The devices which are needed to accommodate this course are white board, OHP, and computer 3. Minimum Students Presence: 75% 4. Course includes class lecture sessions and laboratory session using computer

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	-
Small Task		1 week		Take home / individual task	20
Medium Task		2 weeks		Take home / individual task	25
Final Project		3 weeks		Take home / individual task	35
Lab. Session		90 minutes		Closed Book	20

References:

1. Engineering Drawing Textbook
2. Sato, Takeshi and Sugiarto, N. Menggambar Mesin Menurut ISO
3. AutoCAD 2006 Modules
4. Other references

General Learning Outcomes/Objectives:

1. Students are able to draw basic geometry construction and projection agree with ISO standard
2. Students have capability to use CAD software such as AutoCAD

SYLLABUS

Subject Title : **Linear Algebra**
Subject Code / Academic Unit / Semester : **TKM 121 / 2 / II**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1.	**Matrix** Basic Concepts Matrix Addition, Scalar Multiplication	Ref. 1 Ch. 7		Introduce and explain about basic concepts of linear algebra with its models and applications		
2.	Linear System Of Equations, Gauss Elimination	Ref. 1 Ch. 7		Find linear equation solution with Gauss elimination		
3.	Linear Independence, Vector Space, Rank of Matrix Linear System: General Properties of Solution	Ref. 1 Ch. 7		Explain concepts of linear independence, vector space, and rank of matrix		
4.	Quiz 1	Ref. 1 Ch. 7		Quiz Results		
	Inverse of a Matrix Determinants Rank of Terms in Determinants, Cramer's Rule	Ref. 1 Ch. 7		Find inverse and determinan of a matrix. Cramer's rule application to find inverse of a matrix.		
5.	Eigenvalues, Eigenvectors Some Applications of Eigenvalues, Eigen vectors Symmetric, Skew-Symmetric and Orthogonal Matrices	Ref. 1 Ch. 7		Explain about eigenvalue and eigenvector and apply it into a problem set. Explain concepts of Symmetric, Skew-Symmetric and Orthogonal Matrices.		
6.	Quiz 2	Ref. 1 Ch. 7		Quiz Results		
	Properties of Eigenvectors, Diagonalization, Vector Spaces, Inner Product Spaces, Linear Transformation	Ref. 1 Ch. 7		Explain diagonalization problems and linear transformation		
7.	**Vector** Vector Algebra in 2-Space and 3-Space Inner Product Vector Product	Ref. 1 Ch. 8		Explain Vector Algebra in 2-Space and 3-Space Explain about the operation of Inner Product (dot) and Vector Product (cross).		
8.	Midterm Examination	Ref. 1 Ch. 7, 8		Midterm Examination Results		
9.	Curve, tangent and Arc Length Velocity and Acceleration	Ref. 1 Ch. 8		Explain about curve, tangent, and arc length with vector concepts. Explain about velocity and acceleration with vector concepts.		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
10.	Review from Calculus in Several Variables Gradient of Scalar Field, Directional Derivatives	Ref. 1 Ch. 8		Explain about chain rule concept in several variables. Explain about gradient function (grad f), differential operator (nabla).		
11.	Divergence of a Vector Field Curl of a Vector Field	Ref. 1 Ch. 8		Explain about divergence and invariance of divergence. Explain about curl vector.		
12.	Final Examination			Final Examination Results		

STANDARD COURSE DESCRIPTION

LINEAR ALGEBRA

Subject Title	:	Linear Algebra
Subject Code/Academic Unit	:	TKM 121 / 2
Semester	:	II
Prerequisite	:	-
Brief Information	:	1. This subject becomes a prerequisite course for Kinematics and Dynamics, Finite Elements Methods, CAD/CAM, and Rotor Dynamics courses. 2. Minimum Students Presence: 75% 3. Course includes class lecture sessions, homework, quiz, midterm examination, and final examination.

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	5
Homework		1 week			10
Quiz		30 minutes after one chapter has finished		Closed Book	20
Midterm Exam.		120 minutes		Opened Book	30
Final Exam.		120 minutes		Opened Book	35

References:

1. Kreyszig, Erwin, Advanced Engineering Mathematics, John Wiley & Sons Inc., Toronto, 1993.
2. Hadley, D., Linear Algebra, Addison-Wesley Publishing Co., ---, 1983
3. Other linear algebra references that is related with engineering.

General Learning Outcomes/Objectives:

After attend Linear Algebra course, it is expected that students will be able to apply linear algebra to solve engineering problems.

SYLLABUS

Subject Title : **Physics II**
Subject Code / Academic Unit / Semester : **TKM 122 / 3 / II**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1.	Charge and Matter Electric Field	Ref. 1 Ch. 26, 27 Ref. 2 Ch. 29 Ref. 3 Ch. 18		Explain About Electric Charge, Coulomb's Law, Electric Field, Force Lines, Dipole In Electric Field		
2.	Gauss's Law	Ref. 1 Ch. 3 Ref. 2 Ch. 30 Ref. 3 Ch. 18		Explain about Flux, Electric Field Flux, Gauss's Law, isolated conductor, Gauss's Law Application, nucleus model of atom		
3	Electric Potential	Ref. 1 Ch. 29 Ref. 2 Ch. 31 Ref. 3 Ch. 18		Explain about electric potential, power of electric potential, potential that was generated by a dipole, electrostatic generator		
	Quiz 1	1st to 3rd session		Student's understanding to 1st to 3rd session topic courses		
4.	Capacitors and Dielectrics	Ref. 1 Ch. 30 Ref. 2 Ch. 32		Explain about capacitance, capacitance calculation, parallel plat dielectric capacitors, dielectrics, dielectrics and Gauss's Law, Energy storage in electric field in series and parallel circuits.		
5.	Current and Resistance	Ref. 1 Ch. 31 Ref. 2 Ch. 33		Explain about current, resistance, Emf and electric circuits, Ohm's Law, series and parallel circuits, ammeters and voltmeter, ohm's in microscopic view		
6.	Electro-motive voltage and Electric Circuits	Ref. 1 Ch. 32		Explain about electro-motive voltage, current calculation, single and multiple circuits, potentiometer, and RC, RL, RLC circuits		
7.	Midterm Examination	1st to 6th session		Students are able to answer midterm problems correctly		
8.	Magnetic Field	Ref. 1 Ch. 33 Ref. 2 Ch. 34 Ref. 3 Ch. 21		Explain about magnetic field, magnetic forces, hall effect, galvanometer, magnetic materials, motor.		
9.	Ampere's Law	Ref. 1 Ch. 34		Explain about Ampere's Law, two parallel conductors, Biot-Savart Law		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
9.	Faraday's Law	Ref. 1 Ch. 35 Ref. 2 Ch. 36		Explain about Faraday's Law, Lenz's Law, induction, magnetic fields changes to time, betatron, relative motion induction.		
10.	Properties and Dispersion of light	Ref. 1Ch. 41and 46 Ref. 2 Ch. 24		Explain about light rate, Doppler's effect, diffraction, characteristics of light source.		
11.	Reflection and Imaging	Ref. 1 Ch. 43and 44 Ref. 2 Ch. 25and 26		Explain about Huygens's principle, reflection law, imaging, mirrors, lenses, aberration, and spherical wave.		
	Quiz 2	8th, 9th, and 11th session		Students are able to answer quiz 2 problems correctly		
12.	Waves and Particles	Ref. 1 Ch. 50 Ref. 3 Ch. 19		Explain about matter waves, atom structure, and standing waves, Bohr's atom, wave's mechanics, uncertainty principle, atom and molecule.		
13.	Quantum Mechanical and Atom Structure	Ref. 3 Ch. 20		Explain about Atomic Quantum Number of Hydrogen, Pauli's Principle, Atom Structure And Periodic System, and Atom Emission And Spectrum Absorption.		
15.	FINAL EXAMINATION					

STANDARD COURSE DESCRIPTION

PHYSICS II

Subject Title	:	Physics II
Subject Code/Academic Unit	:	TKM 122 / 3
Semester	:	II
Prerequisite	:	Physics I and Calculus I
Brief Information	:	1. This subject is included in basic science 2. Minimum Students Presence: 75% 3. Course includes class lecture sessions, homework, quizzes, a group report of literature search on assigned topics, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	0
Home work		1 week		Opened book	10
Quiz		30 minutes after one chapter has finished		Opened book / closed book	20
Midterm Exam.		120 Minutes		--	30
Final Exam.		120 Minutes		--	40

References:

1. Halliday & Resnick., *Fisika Jilid 1*, Penerbit Erlangga., Jakarta, 1996.
2. Zafiratos, Chris D., *Physics*, John Wiley & Sons Inc., New York, 1976.
3. Kane & Sternheim, *Physics*, John Wiley & Sons Inc., New York, 1980.

Suggestion:

1. Other physics books.

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Short description : This course give general view abut engineering and the technology of manufacturing process, tools, and obstacle
General Objective : can understand basic process in manufacturing industry, like: casting, forging, and cutting, They also expected to know material behavior related to it manufactured process. And to know general aspect on manufacturing process

No	SPESIFIC OBJECTIVE	MAIN COURSE DESCRIPTION	SUB COURSE DESCRIPTION	TIME ESTIMATION (MENIT)	LEARNING METHOD	DESIRABLE STUDENT COMPETENCIES	TEXT BOOK SOURCE
1	Understanding general material which are used in manufacturing process, such as metal and its alloy, steel, polymer and ceramics	Material and manufacturing process	General introduction, material behavior, alloy, steel, nonferro metal and its alloy, polymer and ceramics	150	Presentation, Exercise, Discussion.	Internet literature and English language	Ref. 1
2	Introduction to metal casting in industry	Principle of Metal casting	- Identify nature symptoms affected casting process	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
3	Introduction to casting method for ferro metal, Quality control in casting process	Metal casting Process	- Casting using various type of mould : sand, plaster-mold,ceramic, vacuum and centrifugal	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
4	Introduction to industrial casting, especially metal ferro cast	Casting design	- Casting design parameter, metal alloy cast, and economic aspect of casting	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
5	Introduction to rolling classification and its product	Rolling	Flat rolling from various aspect, shape meilling process, and pipe making connectionless	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
6	Introduction to forged based classification, machine tools, general practiced, and economic review	Forging	Forging process and affected parameter	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
7	Introduction to classification based on extrusion and drawing, defects, and tension remains	Extrusion and drawing	extrusion process and kinds of process based on extrusion	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
8	Identify kinds of production process based on metal sheet forging process, and economical aspect from sheet-metal	Sheet-metal forming	Forged on sheet-metal forming and production affected aspect	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1

	molding and other kind of molding process, casting process and cold-forming for plastic	shaping plastic	Printing		Discussion	and English language	
10	Identify several aspect on cutting process, like: cutting process mechanism, orthogonal and oblique cutting process, force and stress happened on cutting process, chisel wear, and machinability	Principle of cutting	Cutting process principle and mechanism, and affected parameter	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
11	Identify cutting chisel material: HSS, cast-cobalt alloy, and carbide, cutting tool reconditioning, and cutting fluid	Chisel material and cutting fluid	Cutting chisel material and cutting fluid	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
12	Introduction to lathe machine and its parameter, thread cutting, boring, drilling, reaming, and tapping process	Chisel material and cutting fluid	Axisimetric cutting. Cylindric product shape, and cutting parameter	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
13	Introduction to milling mechanism, and cutting chisel used, also broaching, sawing, and gear manufacturing process	Cutting process for making multi shape	General cutting based on milling, cutting mechanism for milling	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1
14	Introduction to forge welding, arc welding, and used electrode, various type of welding extension, welding quality, and welding extension examination, brazing process,soldering, mechanical extension, and plastic product extension	Extension process	Extension process based on welding, soldering, and mechanical extension	150	Presentation, Exercise, Discussion	Internet literature and English language	Ref. 1

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 1st

A. Course Objective
1. General Objective : Understanding material behavior and its characteristic which have influenced manufacturing process
2. Specific Objective : Understanding general material which are used in manufacturing process, such as metal and its alloy, steel, polymer and ceramics

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Material and manufacturing process

E. Sub Course description:
General introduction, material behavior, alloy, steel, nonferro metal and its alloy, polymer and ceramics

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 2nd

A. Course Objective
   1. General Objective : Metal chilling, fluid flows, heat transfer, metal melting, and casting defect
   2. Specific Objective : Introduction to metal casting in industry
B. Desirable student competencies:
   Internet literature and English language
C. Course Method:
   Presentation, Exercise, Discussion.
D. Main course description:
   Principle of Metal casting
E. Sub Course description:
   Identify nature symptoms affected casting process
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
   Home Work, Small test, mid exam and final exam
H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 3rd

A. Course Objective
1. General Objective : Introduction to various type of metal casting method used in industry
2. Specific Objective : Introduction to casting method for ferro metal, Quality control in casting process

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Metal casting Process

E. Sub Course description:
Casting using various type of mould : sand, plaster-mold,ceramic, vacuum and centrifugal

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 4th

A. Course Objective
1. General Objective : Introduction to casting as a multi dimensional industrial activity
2. Specific Objective : Introduction to industrial casting, especially metal ferro cast

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Casting design

E. Sub Course description:
Casting design parameter, metal alloy cast, and economic aspect of casting

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 5th

A. Course Objective
   1. General Objective : Introduction to rolling process and its variation
   2. Specific Objective : Introduction to rolling classification and its product
B. Desirable student competencies:
   Internet literature and English language
C. Course Method:
   Presentation, Exercise, Discussion.
D. Main course description:
   Rolling
E. Sub Course description:
   Flat rolling from various aspect, shape meilling process, and pipe making connectionless
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
   Home Work, Small test, mid exam and final exam
H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 6th

A. Course Objective
1. General Objective : Introduction to forging process, material forge ability, and lubrication process
2. Specific Objective : Introduction to forged based classification, machine tools, general practiced, and economic review

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Forging

E. Sub Course description:
Forging process and affected parameter

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 7th

A. Course Objective
   1. General Objective : Test student ability concerning process of production
   2. Specific Objective : -
B. Desirable student competencies:
   Internet literature and English language
C. Course Method:
   Presentation, Exercise, Discussion.
D. Main course description:
   Mid exam
E. Sub Course description:
   Previous course material which has been given
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
   Home Work, Small test, mid exam and final exam
H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 8th

A. Course Objective
1. General Objective : Introduction to Extrusion process, Extrusion defect, drawing process, and its tools
2. Specific Objective : Introduction to classification based on extrusion and drawing, defects, and tension remains

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Extrusion and drawing

E. Sub Course description:
extrusion process and kinds of process based on extrusion

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 9th

A. Course Objective
1. General Objective : Introduction to metal sheet forging process, identify products result from sheet-metal forging process
2. Specific Objective : Identify kinds of production process based on metal sheet forging process, and economical aspect from sheet-metal forming

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Sheet-metal forming

E. Sub Course description:
Forged on sheet-metal forming and production affected aspect

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 10th

A. Course Objective
1. General Objective : Introduction to injection process and casting variation for plastic
2. Specific Objective : Introduction to injection molding and other kind of molding process, casting process and cold-forming for plastic

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Forming and shaping plastic

E. Sub Course description:
Plastic Forming and Printing

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 11th

A. Course Objective
1. General Objective : Introduction to basic process of cutting, Free body diagram of cutting chisel
2. Specific Objective : Identify several aspect on cutting process, like: cutting process mechanism, orthogonal and oblique cutting process, force and stress happened on cutting process, chisel wear, and machinability

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Principle of cutting

E. Sub Course description:
Cutting process principle and mechanism, and affected parameter

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 12th

A. Course Objective
1. General Objective : Identify material used for cutting chisel, and cutting fluid
2. Specific Objective : Identify cutting chisel material: HSS, cast-cobalt alloy, and carbide, cutting tool reconditioning, and cutting fluid

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Chisel material and cutting fluid

E. Sub Course description:
Cutting chisel material and cutting fluid

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 13th

A. Course Objective
1. General Objective : Introduction to lathe process and its parameter, identify several process which make round shape
2. Specific Objective : Introduction to lathe machine and its parameter, thread cutting, boring, drilling, reaming, and tapping process

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Chisel material and cutting fluid

E. Sub Course description:
Axisimetric cutting. Cylindric product shape, and cutting parameter

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 14th

A. Course Objective
1. General Objective : Introduction to cutting using milling machine, and other process beside milling
2. Specific Objective : Introduction to milling mechanism, and cutting chisel used, also broaching, sawing, and gear manufacturing process

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Cutting process for making multi shape

E. Sub Course description:
General cutting based on milling, cutting mechanism for milling

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 15th

A. Course Objective
   1. General Objective : Tested student ability concerning process of production
   2. Specific Objective : -
B. Desirable student competencies:
   Internet literature and English language
C. Course Method:
   Presentation, Exercise, Discussion.
D. Main course description:
   Mid exam
E. Sub Course description:
   Previous course material which has been given
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
   Home Work, Small test, mid exam and final exam
H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

STANDARD COURSE OUTLINE

Subject : **PROCESS OF PRODUCTION**
Subject Code : TKM 126
Subject Credit : 3
Class schedule : 3 x 50 minutes
Lecture : 16th

A. Course Objective
1. General Objective : Introduction to welding prosess and its variation, soldering process, and mechanics extension process
2. Specific Objective : Introduction to forge welding, arc welding, and used electrode, various type of welding extension, welding quality, and welding extension examination, brazing process,soldering, mechanical extension, and plastic product extension

B. Desirable student competencies:
Internet literature and English language

C. Course Method:
Presentation, Exercise, Discussion.

D. Main course description:
Extension process

E. Sub Course description:
Extension process based on welding, soldering, and mechanical extension

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	INTRODUCTION	10	Preface	Listening	LCD White board Computer
2	PRESENTATION	130	Discussion and study cases	Asking & Giving opinion	LCD White board Color marker
3	CLOSING	10	Giving course conclusion	Asking & Giving opinion	LCD White board Color marker

G. Method of assessment
Home Work, Small test, mid exam and final exam

H. Text Book
1. *Manufacturing Engineering and Technology*, Second Edition, Serope Kalpakjian, Addison Wesley Publishing Company, 1992.

GARIS-GARIS BESAR PROGRAM PEMBELAJARAN (GBPP)

Judul Mata Kuliah : **Statika Struktur**

Nomor Kode/SKS : TKM 127 / 3 SKS

Informasi Singkat :

1. Mata kuliah ini merupakan mata kuliah wajib dengan prasyarat telah mengikuti mata kuliah Kalkulus I dan Fisika I
2. Mata kuliah ini sebagai dasar untuk mengikuti mata kuliah Teori Kekuatan Material dan Dinamika
3. Alat Bantu ajar yang digunakan (disesuaikan kondisi : White Board, OHP, In-Focus dan komputer)
4. Kehadiran mahasiswa minimal 75%
5. Mahasiswa diharuskan membaca buku pegangan wajib
6. Proses pembelajaran meliputi : tatap muka di kelas, pekerjaan rumah, dan ujian/test

Tujuan Instruksional Umum (TIU)

Setelah mengikuti kuliah ini mahasiswa diharapkan mengetahui dan memahami konsep dasar gaya dan kondisi keseimbangan serta cara-cara perhitungannya.

No.	Tujuan Instruksional Khusus (TIK)	Pokok Bahasan	Sub Pokok Bahasan	Estimasi Waktu (menit)	Metode Pembelajaran	Kemampuan Soft Skill	Sumber Kepustakaan
1	Students can identify engineering knowledge especially in mechanics, can understand the definition of vector and forces dimension and can doing force vector problems	Introduction	Mechanics Scope and Forces Vector	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student can conceive mechanical engineering knowledge concerning mechanics field and using their logical manner to solve problems of forces and vector	1
2	Students can calculate forces resultant, formulation, and quantify forces through algebra and vector, couple definition, shear moment, vector operation moment, also to solve system of forces problems in two dimensions	system of Forces and moment	System of forces, moment, couple, forces and couple resultant in two dimensions	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student remember basic principle of mechanics about system of forces and moment and physics of mechanics, understand several mechanics term in English and how to communicate using proper Indonesian language	1
3	Students can calculate forces resultant, formulation, and quantify forces through algebra and vector, couple definition, shear moment, vector operation moment, also to solve system of forces problems in three dimensions	System of Forces and moment	System of forces, moment, couple, forces and Couple resultant in three dimensions	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student remember basic principle of mechanics about system of forces and moment and physics of mechanics, understand several mechanics term in English and how to communicate using proper Indonesian language	1

No.	Tujuan Instruksional Khusus (TIK)	Pokok Bahasan	Sub Pokok Bahasan	Estimasi Waktu (menit)	Metode Pembelajaran	Kemampuan Soft Skill	Sumber Kepustakaan
4	Students can understand static equilibrium equation in two and three	Equilibrium	Free-Body diagram, Types of support and its reaction, two	3 x 50	➢ Presentation ➢ Discussion/Q& A	Student have read and remembered materials which	1

	dimension, kinds of support, and support reaction, free-body diagram and solving problems concerning about equilibrium in two and three dimension		and three dimension equilibrium		➢ Home Work	have been given, listen carefully and can summarize it	
5	Students can make truss free body diagram in two and three dimension, truss analysis with joint method, cutting, cutting and joint combination, introduction of FEM, truss problem solving in two and three dimension.	Truss	Truss in two and three dimension	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
6	Students can make frames structure free body diagram in two and three dimension, and each bar analysis using static equilibrium method	Frames	Frames area and space	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
7	Students can make frames structure free body diagram in two and three dimension, and each bar analysis using static equilibrium method	Mechine	Machine in two and three dimension	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
No.	Tujuan Instruksional Khusus (TIK)	Pokok Bahasan	Sub Pokok Bahasan	Estimasi Waktu (menit)	Metode Pembelajaran	Kemampuan Soft Skill	Sumber Kepustakaan
8	To see studenty competencies after following course 1 to 7	Structure Statistica	Materi perkuliahan tatap muka 1 s/d 7	3 x 60	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
9	Students can understand types of forces distribution, and making model from its shape, looking for the centre of centroid from item with regular and composite shapes	Forces distribution	The definition of forces distribution and determine centroid centre (centre of line, area, mass, and weight)	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
10	Students can understand how to determine centroid using papus theorem, making free body diagram of moment and forces on beams distributed forces cases	Distributed forces	distributed forces on beam and wire	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1

	also wires distributed forces problem						
11	Students can understand how to determine friction direction, free body diagram, and static equilibrium equation cases relate to friction	Friction	The definition of friction and its implementation on engine	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1

No.	Tujuan Instruksional Khusus (TIK)	Pokok Bahasan	Sub Pokok Bahasan	Estimasi Waktu (menit)	Metode Pembelajaran	Kemampuan Soft Skill	Sumber Kepustakaan
12	Students can solve friction cases on machine	Friction	Friction implementation on machine	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
13	Students able to make a translation sketch and forces from structure and machine also to make its virtual equation	Virtual work	Structure analysis using virtual work	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
14	Students able to calculate moment of inertia of a composite body and its implemetation	Moment of inertia	Moment of inertia calculation and implementation	3 x 50	➢ Presentation ➢ Discussion/Q& A ➢ Home Work	Student have read and remembered materials which have been given, listen carefully and can summarize it	1
15	To Measure student capability after attending course 9 to 14	2nd Exam	Course material 9 to 14	2 x 60	➢ Essay Problems ➢ Closed Books	Student have read and remembered materials which have been given, listen carefully and can summarize it	1

No.	Tujuan Instruksional Khusus (TIK)	Pokok Bahasan	Sub Pokok Bahasan	Estimasi Waktu	Metode Pembelajaran	Kemampuan Soft Skill	Sumber Kepustaka

				(menit)			an
16	To Measure student capability after attending all static classes	Final Exam	All corse material 1 to 15	2 x 60	➢ Essay Problems ➢ Closed Books	Student have read and remembered materials which have been given, listen carefully and can summarize it	1

Kepustakaan : 1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 1st

A. Course Objective
General Objective : Students can understand mechanics and force, mechanics material scope, static course scope, vector and force vector operation
Specific Objective : Students can identify engineering knowledge especially in mechanics, can understand the definition of vector and forces dimension and can doing force vector problems

B Desirable student competencies:
Student can conceive mechanical engineering knowledge concerning mechanics field and using their logical manner to solve problems of forces and vector

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Introduction
E. Sub Course description : Mechanics Scope and Forces Vector
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1.explaininging course material and references 2.explaininging course regulation 3. explaining TIU and TIK	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining engineering field and the definition of mechanics 2.explaining the development of mechanics and Newton's Law 3.Explaining the definition of forces, forces vector, and vector operation 4. Give problem exercise and solving	Paying attention and asking	Computer, LCD Projector and White Board

			5. Give class problem		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 2nd

A. Course Objective

General Objective : Students can understand system of forces and forces resultant, the Definition of moment and terms, moment vector, and moment Resultant in two dimensions

Specific Objective : Students can calculate forces resultant, formulation, and quantify forces through algebra and vector, couple definition, shear moment, vector operation moment, also to solve system of forces problems in two dimensions

B. Desirable student competencies:
Student remember basic principle of mechanics about system of forces and moment and physics of mechanics, understand several mechanics term in English and how to communicate using proper Indonesian language

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : system of Forces and moment
E. Sub Course description : System of forces, moment, couple, forces and couple resultant in two dimensions

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining system of forces, forces resultant, forces formulation, addition vectors in two dimension 2. System of vectors operation in two dimension problem 3. System of forces	Paying attention and asking	Computer, LCD Projector and White Board

			example 4. Explaining the definition of couple and moment in two dimension, notation, and moment units 5. Explaining system of moment, Varignion hypothesis, moment resultant, and bending moment and shear moment in two dimension 6. problem exercise about moment and couple in two dimension 7. Class problem about forces and moment in two dimension		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 3rd

A. Course Objective

General Objective : Students can understand system of forces and forces resultant, the definition of moment and terms, moment vector, and moment resultant in three dimensions

Specific Objective : Students can calculate forces resultant, formulation, and quantify forces through algebra and vector, couple definition, shear moment, vector operation moment, also to solve system of forces problems in three dimensions

B. Desirable student competencies:
Student remember basic principle of mechanics about system of forces and moment and physics of mechanics, understand several mechanics term in English and how to communicate using proper Indonesian language

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : System of Forces and moment
E. Sub Course description : System of forces, moment, couple, forces and Couple resultant in three dimensions

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaininging course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining system of forces, forces resultant, forces formulation, addition vectors in three dimension 2. System of vectors operation in three dimension problem 3. System of forces example	Paying attention and asking	Computer, LCD Projector and White Board

			4. Explaining the definition of couple and moment in three dimension, notation, and moment units 5. Explaining system of moment, Varignion hypothesis, moment resultant, and bending moment and shear moment in three dimension 6. problem exercise about moment and couple in three dimension 7. Class problem about forces and moment in three dimension		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment
1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 4th

A. Course Objective
General Objective : Students can understand the definition of equilibrium, system and structure equilibrium, two and three dimension equilibrium.
Specific Objective : Students can understand static equilibrium equation in two and three dimension, kinds of support, and support reaction, free-body diagram and solving problems concerning about equilibrium in two and three dimension

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Equilibrium
E. Sub Course description : Free-Body diagram, Types of support and its reaction, two and three dimension equilibrium

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaininging course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining the definition of equilibrium, equation and condition of static equilibrium 2. Explaining type of support and support reaction, free body diagram 3. equilibrium example 4. explaining equilibrium in three dimension	Paying attention and asking	Computer, LCD Projector and White Board

			5. Problem Exercise		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 5th

A. Course Objective
General Objective : Students can understand the definition of structure, truss classification, truss definition, and two and three dimension truss problem and solving
Specific Objective : Students can make truss free body diagram in two and three dimension, truss analysis with joint method, cutting, cutting and joint combination, introduction of FEM, truss problem solving in two and three dimension.

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Truss
E. Sub Course description : Truss in two and three dimension
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explain the definition of structure and truss in two and three dimension 2. Explain truss analysis using joint method 3. Making free body diagram 4. Problem Example 5. Explaining truss analysis using cutting method	Paying attention and asking	Computer, LCD Projector and White Board

			6. Explaining truss analysis using joint and cutting method 7. Problem exercise 8. Problem example		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 6th

A. Course Objective
General Objective : Students can understand the definition of frame structure, frame classification, frames structure problem solving in two and three dimension
Specific Objective : Students can make frames structure free body diagram in two and three dimension, and each bar analysis using static equilibrium method

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it
C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Frames
E. Sub Course description : Frames area and space
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaininging course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining the definition of frame structure truss in two and three dimension not including beam 2. Explaining frame structure analysis through bar equilibrium 3. Making free body diagram 4. Problem Example 5. Explaininging about making forces and moment diagram in a beam	Paying attention and asking	Computer, LCD Projector and White Board

			6. Problem exercise 7. Problem example		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 8th

A. Course Objective
General Objective : Students can understand the definition ,mechanism and machine also to relate it with previous assumption which is rigid structure and have fulfilled static equilibrium condition
Specific Objective : Students can make machine and its component free body diagram in two and three dimension, also to analyze it using static equilibrium method

B. Desirable Student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Machine
E. Sub Course description : Machine in two and three dimensions
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explain the definition of machine and its mechanism in two and three dimension Explain frame structure analysis through bar equilibrium 2. Explaining how to analyze machine through equilibrium in each part. 3. Making free body diagram of machine	Paying attention and asking	Computer, LCD Projector and White Board

			and its part 4. Explaining free body diagram of special engine component (belt, gear. friction wheel, etc) 5. Problem Example 6. Problem exercise		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 9th

A. Course Objective
General Objective : Students can understand the definition of forces distribution, line centroid, body and composite area and volume
Specific Objective : Students can understand types of forces distribution, and making model from its shape, looking for the centre of centroid from item with regular and composite shapes

B. Desirable Student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Forces distribution
E. Sub Course description : The definition of forces distribution and determine centroid centre (centre of line, area, mass, and weight)

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaininging course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining the definition of force distribution and its example 2. making forces distribution model from real cases 3. Determine forces resultant and centroid 4. Explaining forces distribution in a line, area, and volume and its example	Paying attention and asking	Computer, LCD Projector and White Board

			5. explaining how to determine centroid center on item with regular and composite shape 6. Problem Example 7. Problem exercise		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 10^{th}

A. Course Objective
General Objective : Students can identify distributed forces evaluation method using papus theorem
Specific Objective : Students can understand how to determine centroid using papus theorem, making free body diagram of moment and forces on beams distributed forces cases also wires distributed forces problem

B. Desirable Student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Distributed forces
E. Sub Course description : distributed forces on beam and wire
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining how to make a distributed forces model on a beam, determine forces resultant and center of weight 2. making free body diagram of forces and moment on a beam 3. Problem example 4. Determine forces distribution on a wire cases and its solving	Paying attention and asking	Computer, LCD Projector and White Board

			5. Explaining forces distribution in a line, area, and volume and its example 6. Problem Example 7. Problem exercise		
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 11th

A. Course Objective
General Objective : Students can understand the principle of friction and its implementation on machine
Specific Objective : Students can understand how to determine friction direction, free body diagram, and static equilibrium equation cases relate to friction

B. Desirable Student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it
C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Friction
E. Sub Course description : The definition of friction and its implementation on engine

F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. Explaining the definition of friction and its classification 2. making free body diagram of friction 3. Problem example friction implementation 4. problem solving friction cases using static equilibrium equation 5. Problem exercise	Paying attention and asking	Computer, LCD Projector and White Board
3.	CLOSING	25 minutes	1. Give Course Conclusion	Paying attention and	Computer, LCD Projector

			2. Give Homework	asking	and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Engineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 12th

A. Course Objective
General Objective : Students can solve friction cases on machine
Specific Objective : Students can solve friction cases on machine

B. Desirable Student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Friction
E. Sub Course description : Friction implementation on machine
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. making free body diagram of friction on machine 2. Problem example friction implementation on machine 3. problem solving friction cases using static equilibrium equation 4. Problem exercise	Paying attention and asking	Computer, LCD Projector and White Board
3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H. Text book :

1. Meriam, J. L. and Kraige, L. G., *Machineering Mechanics Static's*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 13th

A. Course Objective
General Objective : Students can identify how to analyze structure and machine with virtual method
Specific Objective : Students able to make a translation sketch and forces from structure and machine also to make its virtual equation

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Virtual work
E. Sub Course description : Structure analysis using virtual work
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. explaining the definition and the concept of virtual work on structure and machine analysis 2. explaining how to make translation diagram and forces on a loaded structure 3. explaining virtual work application on machine and how to solve it 4. Problem solving 5. Problem exercise	Paying attention and asking	Computer, LCD Projector and White Board
3.	CLOSING	25 minutes	1. Give Course Conclusion	Paying attention and	Computer, LCD Projector

			2. Give Homework	asking	and White Board

G. Methode of assesment : 1. Home Works
2. Mid Exam
3. Final Exam

H.Text Book :

1. Meriam, J. L. and Kraige, L. G., *Machineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 14th

A. Course Objective
General Objective : Students can understand the definition and basic principle of moment of inertia and its application
Specific Objective : Students able to calculate moment of inertia of a composite body and its implemetation

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Presentation
2. Discussion/ Q & A
3. Home Work

D. Main course description : Moment of inertia
E. Sub Course description : Moment of inertia calculation and implementation
F. Course Activity:

No	PROGRESSION	TIME ESTIMATION	LECTURER ACTIVITY	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1.	INTRODUCTION	25 minutes	1. explaining course material and references	Paying attention and asking	Computer, LCD Projector and White Board
2.	PRESENTATION	2 x 50 minutes	1. explain the definition and the concept of moment of inertia 2. explain moment of inertia example and application for any kind of structure 3. explain the concept of moment of inertia on a standart body 4. explain how to evaluate moment of inertia on composite body 5. Problem solving 6. Problem exercise	Paying attention and asking	Computer, LCD Projector and White Board

3.	CLOSING	25 minutes	1. Give Course Conclusion 2. Give Homework	Paying attention and asking	Computer, LCD Projector and White Board

G. Method of assessment : 1. Home Works
2. Mid Exam
3. Final Exam

H.Text Book :

1. Meriam, J. L. and Kraige, L. G., *Machineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 15th

A. Course Objective
General Objective : To Measure student capability after attending course 9 to 14
Specific Objective : To Measure student capability after attending course 9 to 14

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Essay Problems
2. Closed Books
D. Main course description : 2nd Exam
E. Sub course description : Course material 9 to 14
F. Course Activity:

Lecturer

1. Give problems
2. Assesing problems

Student

1. Doing 2nd Exam

G. Method of assessment: 1.Home work
2. 2nd Exam

H.Text Book :

1. Meriam, J. L. and Kraige, L. G., *Machineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

STANDARD COURSE OUTLINE

Subject : **STATIC**
Subject Code : TKM 127
Subject Credit : 3
Class Schedule : 3 x 50 minutes
Lecture : 16th

A. Course objective
General objective: To Measure student capability after attending all static classes
Specific objective: To Measure student capability after attending all static classes

B. Desirable student competencies:
Student have read and remembered materials which have been given, listen carefully and can summarize it

C. Course Method : 1. Essay Problems
2. Closed Books
D. Main course description : Final Exam
E. Sub course description : All corse material 1 to 15
F. Course Activity:

Lecturer

1. Give problems
2. Assesing problems

Student

1. Doing final Exam

G.Method of assessment : 1. Home Work
2. 1st and 2nd exam
3. Final Exam

H.Text Book :

1. Meriam, J. L. and Kraige, L. G., *Machineering Mechanics Statics*, Fifth Edition, ISBN 0-471-40646-5, John Wiley & Sons, Inc., USA, 2002

SYLLABUS

Subject Title : **Structure Analysis**
Subject Code / Academic Unit / Semester : **TKM 127 / 3 / II**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1	Introduction Force Vector	Ref. I Ch.1		- Understand about Statics and its applications. - Understand about force as a vector		
2	Two Dimensional Force Systems Moments and Couples Forces Resultant	Ref. I Ch.2, Ref II		- Know about two dimensional forces. - Understand about summation and distribution of forces, moments, and couples in two dimensional problems.		
3	Three Dimensional Force Systems Moments and Couples Resultants	Ref. I Ch.2		- Know about three dimensional forces. - Understand about summation and distribution of forces, moments, and couples in three dimensional problems.		
4	Equilibrium in Two Dimension Equilibrium in Three Dimension	Ref. I Ch.3		- Understand about force equilibrium in two and three dimension problems.		
5	Two Dimensional Trusses Three Dimensional Trusses	Ref. I Ch.4		- Understand about trusses construction in two and three dimensions.		
6	Frames and Machines	Ref. I Ch.4		- Understand about analysis methods of frame and machine		
7	Midterm Examination			- Midterm Examination Results		
8	Distributed Forces Centroids of Lines, Area, and Volume Composite bodies and figures	Ref. I Ch.5		- Know about distributed forces concepts. - Understand the methods to analyze distributed forces based on its shapes approaches.		
9	- Theorems of Pappus - Beams - Flexible Cables	Ref. I Ch.5		- Understand about the calculation methods of distributed load in beams and cables application		
10	- Friction - Friction Indications - Application of Friction in Machines	Ref. I Ch.6		- Know about friction concepts between two matters. - Understand about analysis methods of friction in machines		
11	- Application of Friction in Machines	Ref. I Ch.6		- Understand about analysis methods of friction in machines		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
12	- Virtual Work	Ref. I Ch.7		- Know and understand about the concepts and applications of virtual work methods		
13	- Moments of Inertia	Ref. I		- Understand about calculation methods of moments of inertia		
14	- Midterm Examination 2			- Midterm Exam. 2 Results		
15	Final Examination					

STANDARD COURSE DESCRIPTION

STRUCTURE ANALYSIS

Subject Title	:	Structure Analysis
Subject Code/Academic Unit	:	TKM 127 / 3
Semester	:	II
Prerequisite	:	Calculus I and Physics I
Brief Information	:	1. This subject is a basic course for attend Mechanical of Material Strength and Dynamics Courses 2. The devices which are needed to accommodate this course are white board, OHP, In-focus (conditional) 3. Minimum Students Presence: 75% 4. Students must read the handbook that is suggested by lecturer 5. Course includes class lecture sessions, homework, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	5
Homework		1 week		Opened book	10
Midterm Exam. I		120 minutes		Closed book	20
Midterm Exam. II		120 Minutes		Closed book	30
Final Exam.		120 minutes		Closed book	35

References:

1. Meriam, J.L and Kraige, L.G; *Engineering Mechanics, Statics.* Volume 1, *2nd edition*, John Wiley & Sons, Inc, 1987
2. Thimoshenko : Mekanika Teknik, Penerbit Erlangga

General Learning Outcomes/Objectives:

After attend this structure analysis course, it is expected that students will be able to know and understand basic concepts of force and equilibrium condition, and also its calculation methods.

GARIS-GARIS BESAR PROGRAM PEMBELAJARAN (GBPP)

SUBJECTS TITLE : **ENGINEERING MATERIAL**
SUBJECTS CODE : **TKM-128/ 3**
BRIEF DESCRIPTION : This subjects is explain about material general image and use; atom structure; structure and crystal defect; mechanical properties; physical properties, thermal properties and chemical properties; dislocation and material strengthen; failure; diagram and phase transformation; thermal process and metal combination; polymer ceramic; semiconductor; material classification; material identification and material standard

GENERAL COURSE OBJECTIVES : After finishing this subjects students able to explain, aplly and finished related problems with material

No	COURSE OBJECTIVES	MAIN COURSE DESCRIPTION	SUB COURSE DESCRIPTION	TIME ESTIMATE	COURSE METHOD	DESIRABLE STUDENT COMPETENCY	TEXTBOOK
1	Students know and understand about material, history, development and use	Introduction	Image about macro and micro material structure of metal Material properties and material selection	150	Lecture with LCD and Whiteboard	Students understand about material important and its use	Book 1, Chapter1
2	Students able to know and understand about atom structure and atom bonds	Atom Structure and Atom Bonds	Bond force and bond energy; ionic bonds; coordination number; covalent-metallic-secondary bonds	150	Lecture with LCD and Whiteboard	Students understand about atom structure and bonds	Book 1, Chapter2
3	Students able to know and understand about structure and material crystal system	Crystal Structure	Crystal system; crystal lattice; metallic structure; density calculation; crystallographic plane and direction; line density and atomic plane; single and multi crystal material; Bragg law and its use; X ray diffraction	150	Lecture with LCD and Whiteboard	Students understand about structure shape and structure interface, and know structure position using light diffraction and Bragg law	Book 1, Chapter3

4	Students able to know and understand about defect occur in material	Crystal Defect	Kinds of defect; impurities; diffusion mechanism; dislocation; slip system; twin; phase border; macro and microscopic test; grain size	150	Lecture with LCD and Whiteboard	Students understand about defect occur on crystal, and able to test macro and micro structure and grain size	Book 1, Chapter5
5	Students able to know and understand about material mechanical properties	Material Mechanical Properties	Tensile Test; toughness-resilience and strength; hardness	150	Lecture with LCD and Whiteboard	Students understand about mechanics properties and read strain versus stress diagram, differentiate toughness-resilience and strength, and hardness	Book 1, Chapter7
6	Students able to know and understand about dislocation and strengthen mechanism	Dislocation and Strengthen Mechanism	Dislocation; slip system; Burger vector; critical shear stress; polycrystalline material deformation; strengthen mechanism; restoration, recrystallization, grain growth	150	Lecture with LCD and Whiteboard	Students understand about dislocation and material strengthen	Book 1, Chapter5
7	Students able to know and understand about failure occur in material	Failure	Micro structure to evaluate failure; brittle break and tough; break mechanics; tough-brittle transition; fatigue; initiation and crack creeping; creep;	150	Lecture with LCD and Whiteboard	Students understand about failure samples and it cause, also can differentiate brittle break and toughness; fatigue; crack; creep	Book 1, Chapter9
8	Midterm Exam	All subjects material start from the first until seventh meeting	-	150	Ability Test	-	
9	Students able to know and understand about phase diagram	Phase Diagram	Phase diagram and micro structure; binary eutectic system; micro structure growth; Gibb phase rule; carbon iron system; alloy element influence	150	Lecture with LCD and Whiteboard	Students able to know and understand about phase diagram; phase Gibb rule; carbon iron system; alloy substance influence	Book 1, Chapter10

10	Students able to know and understand about phase transformation	Phase Transformation	Transformation and core; TTT transformation diagram; carbon iron system; heat treatment; final structure arrangement	150	Lecture with LCD and Whiteboard	Students able to know and understand about material phase transformation and core	Book 1, Chapter11
11	Students able to know and understand about metal thermal process and combination	Thermal Process Metal Combination	Hardness capability, hardness versus coldness; precipitation hardening	150	Lecture with LCD and Whiteboard	Students able to know and understand about metal thermal process and alloy and behavior	Book 1, Chapter11
12	Students able to know and understand about metal combination	Metal Alloy	Metal fabrication; ferrous alloy; cast iron; cast iron fabrication; nonferrous alloy	150	Lecture with LCD and Whiteboard	Students able to know and understand about metal alloy and fabrication	Book 1, Chapter11
13	Students able to know and understand about ceramic	Ceramic and Glass Keramik & Glass	Crystal structure; defect; phase diagram; mechanics properties; fabrication and process; heat treatment; refractory; metal and non metal powder introduction	150	Lecture with LCD and Whiteboard	Students able to know and understand about ceramic and glass after heat treatment	Book 1, Chapter3
14	Students able to know and understand about polymer	Polymer	Polymer materials; molecule weight distribution; molecule shape; structure; molecular configuration; crystalline; mechanics properties; polymer semi crystal deformation level; crystallization; viscoelasticity; crack	150	Lecture with LCD and Whiteboard	Students able to know and understand about mechanical properties polymer	Book 1, Chapter4
15	Students able to know and understand about semiconductor	Semiconductor	Energy bond structure; electric receptivity on metal; dielectric behavior; Ferro electricity	150	Lecture with LCD and Whiteboard	Students able to know and understand about semiconductor behavior	Book 1, Chapter12
16	Final Exam	All subjects material starts from the eighth until fifteenth meeting	-	150	Ability Test		

OBLIGATION TEXTBOOK

1. Callister, William D Jr., 2001, *Fundamentals of Materials Science and Engineering*, John Wiley & Sons. Inc., New York
2. Smith, William F., 1990, *Principles of Material Science and Engineering*, McGraw-Hill., New York

SUGGESTION TEXTBOO K

2. Callister, William D Jr., 1994, *Material Science and Engineering An Introduction*, John Wiley & Sons. Inc., New York
3. Dieter, George E, 1988, *Mechanical Metalurgy*, , McGraw-Hill., New York.
4. Ashby, Michael F. Ashby & Jones, David R. H. 2002, *Engineering Materials 1- An Introduction to their Properties and Applications*, 2nd Edition, Butterworth-Heinemann, Oxford

SATUAN ACARA PEMBELAJARAN (SAP)

SUBJECTS TITLE : ENGINEERING MATERIAL
SUBJECTS CODE : TKM-128
SEMESTER CREDIT UNITS : 3
CLASS/LABORATORY SCHEDULE : 150 MINUTE
LECTURE : 1
A. COURSE OBJECTIVES
1. GENERAL OBJECTIVES : After finishing this class students able to explain, apply and finish related problems with material
Setelah menyelesaikan matakuliah ini mahasiswa mampu menjelaskan, menerapkan dan menyelesaikan permasalahan yang berhubungan dengan bahan
SPECIFIC OBJECTIVE : Students know and understand about material, history, development and use
Mahasiswa mengetahui dan memahami tentang bahan, sejarah, perkembangan dan penggunaannya
B. DESIRABLE STUDENT COMPETENCY : Students able to understand about important material and it use
Mahasiswa memahami tentang pentingnya bahan dan penggunaannya
C. COURSE METHOD : Lecture with LCD and Whiteboard
Kuliah mimbar dengan alat bantu LCD dan papan tulis
D. MAIN COURSE DESCRIPTION : Introduction about Engineering Material
Pendahuluan tentang Material Teknik
E. SUB COURSE DESCRIPTION : Explanation about materials. Metal macro and microstructure. Properties and material selection
Gambaran tentang bahan. Struktur makro & mikro logam. Sifat-sifat dan pemilihan bahan
F. KEGIATAN BELAJAR MENGAJAR :

NO	STAGES	TIME ESTIMATE	LECTURER	STUDENT ACTIVITY	RESOURCES COMMONLY AVAILABLE
1	**INTRODUCTION**	10	Explain lecture agenda and grading rule	Listen	LCD and Whiteboard
2	**PRESENTATION**	110	Deliver and explain lecture syllabus	Listen and pay attention on syllabus	LCD and Whiteboard
3	**CLOSING**	30	Discussion and Practice	Discussion and doing practice	LCD and Whiteboard

G. METHODS OF ASSESSMENT : Discussion and practice

H. TEXTBOOK :

1. Callister, William D Jr., 2001, *Fundamentals of Materials Science and Engineering*, John Wiley & Sons. Inc., New York
2. Smith, William F., 1990, *Principles of Material Science and Engineering*, McGraw-Hill., New York

Note:
Second meeting same with seventh and ninth meeting until fifteen meeting same SAP, just different instructional purpose and references as printed on GBPP.

SYLLABUS

Subject Title : **Engineering Materials**
Subject Code / Academic Unit / Semester : **TKM 128 / 3 / II**

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
1.	Introduction	Ref. 1 Ch. 1 Ref. 2 Ch. 1		Explain about materials classification in engineering, competition between materials, and materials development trend		
2.	Atomic Bonding	Ref. 1 Ch. 2, 3, 4 Ref. 2 Ch. 2, 3, 4		Explain about atom structure, coordination number, unit cell, crystal defects, dislocation theory, and solidification.		
3	Materials Testing	Ref. 1 Ch. 6 - Ref. 2 Ch. 6 Ref. 3 part 2 - Ref. 4 part 3		Explain about tensile testing, hardness testing, torsion testing, impact testing, fatigue testing, creep testing and metallographic		
4.	Phase Diagram	Ref. 1 Ch. 9 Ref. 2 Ch. 8		Explain about phase diagram, Gibbs's phase rules, Lever's rules, non-equilibrium solidification of alloy, biner diagram, tenary diagram		
5	Steels and Cast Iron	Ref. 1 Ch. 9, 10, 12 Ref. 2 Ch. 8, 9		Explain about phase diagram of Fe-Fe_3C, steels and cast irons production, steels and cast irons properties		
6	Non Ferro and its alloys	Ref. 1 Ch. 12 Ref. 2 Ch. 9		Define about types, properties, and applications of aluminum, magnesium, titanium, and nickel.		
7	Super Alloy	Ref. 1 Ch. 12		Define about types, properties, and applications of super alloy		
8	Midterm Examination	1st to 6th Session		Students are able to answer midterm problems correctly		
9.	Polymers	Ref. 1 Ch. 15, 16 Ref. 2 Ch. 7		Explain about types of polymers, polymerization reaction, properties and structures of polymers, plastic processing, plastic deformation and strengthening, creep and fracture of polymers, polymers applications.		
10.	Ceramics	Ref. 1 Ch. 113, 14 Ref. 2 Ch. 10		Explain about types of ceramics, properties and structures of ceramics, ceramics processing, ceramics deformation and strengthening, ceramics fracture, ceramics applications.		

Week	Course Outline	References	Course Methods	Expected Student Competencies	Assessment Criterions	Value
11.	Composites	Ref. 1 Ch. 17 Ref. 2 Ch. 13		Explain about types of composites, properties and structures of composites, fibres and matrix, composites processing, composites deformation and strengthening, composites applications, and composites structural		
12.	Standard of Materials Codification	ASTM – JIS – DIN		Explain about standard of materials codification		
13.	Corrosion	Ref. 1 Ch. 18 Ref. 2 Ch. 12		Explain about electrochemical, corrosion rate, galvanic cell, types of corrosions, corrosion control		
14.	Material and new processes	Internet and Ref.				
15.	Material and new processes	Internet and Ref.				
16.	Final Examination					

STANDARD COURSE DESCRIPTION

ENGINEERING MATERIALS

Subject Title	:	Engineering Materials
Subject Code/Academic Unit	:	TKM 128 / 3
Semester	:	II
Prerequisite	:	-
Brief Information	:	1. This subject is included in basic science courses 2. Minimum Students Presence: 75% 3. Course includes class lecture sessions, homework, quiz, paper writing and presentation, and two examinations (a midterm and a final)

Evaluation Schedule and Assessment Methods:

Evaluation	Date	Time	Room	Rule	Value (%)
Presence		In every class lecture sessions		Min. 75%	0
Homework		1 week		Opened book	10
Quiz		30 minutes after one chapter has finished		Opened/ Closed book	20
Midterm Exam.		120 Minutes		Closed book	30
Final Exam.		120 minutes		Closed book	40

References:

1. Callister, William D Jr., *Material Science and Engineering an Introduction*, John Wiley & Sons. Inc, 1994.
2. Smith, William F., *Principles of Material Science and Engineering*, McGraw-Hill., New York, 1990.
3. Dieter, George E, *Mechanical Metallurgy,* McGraw-Hill, New York, 1988.
4. Davis, Harmer E, Troxell, George Earl and Hauck, George F.W., *The Testing of Engineering Materials*, McGraw-Hill., New York, 1982.

General Learning Outcomes/Objectives:

1. Students are able to understand about materials classification
2. Students are able to understand about crystal defects, solidification, and dislocation theory.
3. Students gain knowledge about types and methods of material testing and its interpretations
4. Students know about types and properties of metals, polymers, composites, and ceramics, and also its application examples.